ATTC TEST # 302
206.75 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Texas Sign Dude")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-91.99	-93.99	-89.99	-91.99
A2	-86.99	-87.99	-82.99	-85.99
A3	-92.99	-92.99	-86.99	-90.99
A4	-88.99	-89.99	-87.99	-88.99
A5	-92.99	-92.99	-91.99	-92.66
A6	-94.99	-94.99	-89.99	-93.32
A7	-90.99	-91.99	-88.99	-90.66
A8	-88.99	-89.99	-88.99	-89.32
B1	-93.99	-90.99	-92.99	-92.66
B2	-93.99	-89.99	-92.99	-92.32
B3	-89.99	-87.99	-86.99	-88.32
B4	-87.99	-84.99	-86.99	-86.66
B5	-91.99	-86.99	-87.99	-88.99
B6	-92.99	-89.99	-88.99	-90.66
B7	-95.99	-89.99	-91.99	-92.66
B8	-91.99	-88.99	-89.99	-90.32
C1	-86.99	-86.99	-90.99	-88.32
C2	-89.99	-92.99	-90.99	-91.32
C3	-89.99	-90.99	-92.99	-91.32
C4	-89.99	-90.99	-92.99	-91.32
C5	-87.99	-85.99	-90.99	-88.32
C6	-93.99	-92.99	-94.99	-93.99
C7	-91.99	-91.99	-94.99	-92.99
C8	-90.99	-90.99	-93.99	-91.99
Median				-91.16

ATTC TEST # 303
207.25 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Texas Sign Dude")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-89.88	-88.88	-83.88	-87.55
A2	-84.88	-81.88	-81.88	-82.88
A3	-88.88	-84.88	-85.88	-86.55
A4	-87.88	-85.88	-85.88	-86.55
A5	-90.88	-88.88	-87.88	-89.21
A6	-91.88	-88.88	-88.88	-89.88
A7	-90.88	-88.88	-84.88	-88.21
A8	-87.88	-85.88	-83.88	-85.88
B1	-90.88	-87.88	-90.88	-89.88
B2	-89.88	-88.88	-89.88	-89.55
B3	-87.88	-83.88	-87.88	-86.55
B4	-85.88	-81.88	-84.88	-84.21
B5	-85.88	-87.88	-88.88	-87.55
B6	-89.88	-86.88	-90.88	-89.21
B7	-89.88	-90.88	-89.88	-90.21
B8	-87.88	-88.88	-88.88	-88.55
C1	-78.88	-86.88	-81.88	-82.55
C2	-82.88	-89.88	-86.88	-86.55
C3	-81.88	-87.88	-86.88	-85.55
C4	-87.88	-91.88	-87.88	-89.21
C5	-86.88	-92.88	-86.88	-88.88
C6	-85.88	-89.88	-89.88	-88.55
C7	-85.88	-90.88	-88.88	-88.55
C8	-85.88	-90.88	-85.88	-87.55
Median				-87.88

ATTC TEST # 304
207.75 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Texas Sign Dude")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-85.08	-81.08	-79.08	-81.75
A2	-82.08	-76.08	-74.08	-77.41
A3	-82.08	-79.08	-76.08	-79.08
A4	-87.08	-81.08	-80.08	-82.75
A5	-84.08	-80.08	-81.08	-81.75
A6	-90.08	-85.08	-83.08	-86.08
A7	-88.08	-85.08	-82.08	-85.08
A8	-83.08	-77.08	-76.08	-78.75
B1	-87.08	-84.08	-90.08	-87.08
B2	-86.08	-86.08	-91.08	-87.75
B3	-84.08	-79.08	-87.08	-83.41
B4	-83.08	-79.08	-86.08	-82.75
B5	-84.08	-83.08	-88.08	-85.08
B6	-84.08	-86.08	-90.08	-86.75
B7	-84.08	-84.08	-88.08	-85.41
B8	-85.08	-86.08	-89.08	-86.75
C1	-74.08	-81.08	-78.08	-77.75
C2	-80.08	-88.08	-84.08	-84.08
C3	-78.08	-85.08	-81.08	-81.41
C4	-81.08	-88.08	-84.08	-84.41
C5	-79.08	-87.08	-80.08	-82.08
C6	-79.08	-89.08	-83.08	-83.75
C7	-80.08	-86.08	-82.08	-82.75
C8	-78.08	-86.08	-80.08	-81.41
Median				-83.08

ATTC TEST # 305
208.25 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Texas Sign Dude")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-79.97	-75.97	-72.97	-76.30
A2	-76.97	-79.97	-79.97	-78.97
A3	-78.97	-78.97	-79.97	-79.30
A4	-79.97	-79.97	-75.97	-78.64
A5	-78.97	-72.97	-68.97	-73.64
A6	-85.97	-81.97	-76.97	-81.64
A7	-80.97	-78.97	-77.97	-79.30
A8	-78.97	-79.97	-78.97	-79.30
B1	-80.97	-78.97	-84.97	-81.64
B2	-84.97	-82.97	-87.97	-85.30
B3	-78.97	-77.97	-81.97	-79.64
B4	-78.97	-74.97	-80.97	-78.30
B5	-80.97	-80.97	-86.97	-82.97
B6	-83.97	-83.97	-87.97	-85.30
B7	-81.97	-80.97	-84.97	-82.64
B8	-78.97	-78.97	-85.97	-81.30
C1	-77.97	-77.97	-79.97	-78.64
C2	-77.97	-85.97	-80.97	-81.64
C3	-71.97	-77.97	-74.97	-74.97
C4	-76.97	-82.97	-78.97	-79.64
C5	-78.97	-79.97	-78.97	-79.30
C6	-79.97	-84.97	-81.97	-82.30
C7	-72.97	-80.97	-75.97	-76.64
C8	-70.97	-79.97	-73.97	-74.97
Median				-79.30

ATTC TEST # 306
208.83 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Texas Sign Dude")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-83.90	-80.90	-80.90	-81.90
A2	-80.90	-83.90	-82.90	-82.57
A3	-85.90	-80.90	-81.90	-82.90
A4	-78.90	-81.90	-78.90	-79.90
A5	-80.90	-76.90	-77.90	-78.57
A6	-78.90	-79.90	-79.90	-79.57
A7	-80.90	-79.90	-79.90	-80.23
A8	-82.90	-82.90	-78.90	-81.57
B1	-78.90	-78.90	-77.90	-78.57
B2	-79.90	-82.90	-84.90	-82.57
B3	-80.90	-78.90	-77.90	-79.23
B4	-87.90	-80.90	-79.90	-82.90
B5	-80.90	-82.90	-82.90	-82.23
B6	-79.90	-76.90	-85.90	-80.90
B7	-84.90	-83.90	-81.90	-83.57
B8	-79.90	-81.90	-81.90	-81.23
C1	-81.90	-81.90	-82.90	-82.23
C2	-78.90	-77.90	-77.90	-78.23
C3	-78.90	-79.90	-80.90	-79.90
C4	-79.90	-78.90	-78.90	-79.23
C5	-78.90	-78.90	-78.90	-78.90
C6	-79.90	-79.90	-79.90	-79.90
C7	-77.90	-78.90	-79.90	-78.90
C8	-76.90	-78.90	-76.90	-77.57
Median				-80.07

ATTC TEST # 307
209.41 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Texas Sign Dude")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-71.90	-72.90	-73.90	-72.90
A2	-69.90	-74.90	-74.90	-73.23
A3	-70.90	-69.90	-70.90	-70.57
A4	-71.90	-69.90	-67.90	-69.90
A5	-71.90	-71.90	-73.90	-72.57
A6	-70.90	-72.90	-70.90	-71.57
A7	-72.90	-71.90	-66.90	-70.57
A8	-72.90	-69.90	-64.90	-69.23
B1	-68.90	-70.90	-68.90	-69.57
B2	-71.90	-76.90	-75.90	-74.90
B3	-69.90	-68.90	-67.90	-68.90
B4	-75.90	-70.90	-74.90	-73.90
B5	-75.90	-77.90	-77.90	-77.23
B6	-69.90	-67.90	-74.90	-70.90
B7	-69.90	-75.90	-70.90	-72.23
B8	-72.90	-73.90	-70.90	-72.57
C1	-72.90	-71.90	-73.90	-72.90
C2	-67.90	-69.90	-67.90	-68.57
C3	-67.90	-68.90	-68.90	-68.57
C4	-67.90	-66.90	-67.90	-67.57
C5	-67.90	-67.90	-68.90	-68.23
C6	-67.90	-65.90	-67.90	-67.23
C7	-72.90	-73.90	-76.90	-74.57
C8	-72.90	-73.90	-74.90	-73.90
Median				-71.23

ATTC TEST # 305
208.25 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Woman with Roses")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-74.01	-80.01	-79.01	-77.68
A2	-83.01	-77.01	-83.01	-81.01
A3	-81.01	-81.01	-81.01	-81.01
A4	-78.01	-81.01	-78.01	-79.01
A5	-75.01	-71.01	-75.01	-73.68
A6	-82.01	-83.01	-81.01	-82.01
A7	-77.01	-79.01	-79.01	-78.34
A8	-80.01	-76.01	-81.01	-79.01
B1	-80.01	-79.01	-80.01	-79.68
B2	-81.01	-82.01	-86.01	-83.01
B3	-81.01	-79.01	-79.01	-79.68
B4	-80.01	-82.01	-82.01	-81.34
B5	-85.01	-86.01	-82.01	-84.34
B6	-88.01	-83.01	-82.01	-84.34
B7	-85.01	-84.01	-83.01	-84.01
B8	-80.01	-78.01	-82.01	-80.01
C1	-80.01	-83.01	-82.01	-81.68
C2	-77.01	-80.01	-79.01	-78.68
C3	-77.01	-77.01	-78.01	-77.34
C4	-77.01	-79.01	-76.01	-77.34
C5	-80.01	-79.01	-81.01	-80.01
C6	-79.01	-84.01	-79.01	-80.68
C7	-74.01	-78.01	-77.01	-76.34
C8	-74.01	-77.01	-75.01	-75.34
Median				-79.84

ATTC TEST # 306
208.83 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Woman with Roses")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-87.89	-86.89	-85.89	-86.89
A2	-90.89	-90.89	-89.89	-90.56
A3	-88.89	-84.89	-84.89	-86.22
A4	-88.89	-85.89	-87.89	-87.56
A5	-85.89	-81.89	-81.89	-83.22
A6	-87.89	-85.89	-86.89	-86.89
A7	-85.89	-83.89	-87.89	-85.89
A8	-87.89	-83.89	-86.89	-86.22
B1	-84.89	-87.89	-86.89	-86.56
B2	-81.89	-84.89	-86.89	-84.56
B3	-83.89	-87.89	-86.89	-86.22
B4	-88.89	-90.89	-90.89	-90.22
B5	-88.89	-90.89	-88.89	-89.56
B6	-81.89	-83.89	-90.89	-85.56
B7	-86.89	-87.89	-87.89	-87.56
B8	-79.89	-85.89	-88.89	-84.89
C1	-88.89	-87.89	-87.89	-88.22
C2	-85.89	-86.89	-85.89	-86.22
C3	-84.89	-82.89	-80.89	-82.89
C4	-81.89	-81.89	-77.89	-80.56
C5	-86.89	-83.89	-85.89	-85.56
C6	-83.89	-82.89	-83.89	-83.56
C7	-86.89	-86.89	-82.89	-85.56
C8	-83.89	-83.89	-78.89	-82.22
Median				-86.22

ATTC TEST # 307

209.41 MHz

RECEIVER	Undesired Power Level (dBm) TOV ("Woman with Roses")			
	RUN #1	RUN #2	RUN #3	AVG.
A1	-77.95	-79.95	-78.95	-78.95
A2	-77.95	-82.95	-80.95	-80.62
A3	-74.95	-77.95	-74.95	-75.95
A4	-74.95	-79.95	-77.95	-77.62
A5	-76.95	-77.95	-75.95	-76.95
A6	-79.95	-82.95	-78.95	-80.62
A7	-78.95	-81.95	-74.95	-78.62
A8	-78.95	-79.95	-72.95	-77.28
B1	-79.95	-77.95	-78.95	-78.95
B2	-81.95	-75.95	-78.95	-78.95
B3	-77.95	-78.95	-75.95	-77.62
B4	-81.95	-81.95	-81.95	-81.95
B5	-81.95	-83.95	-81.95	-82.62
B6	-83.95	-80.95	-79.95	-81.62
B7	-74.95	-75.95	-76.95	-75.95
B8	-77.95	-72.95	-75.95	-75.62
C1	-79.95	-78.95	-80.95	-79.95
C2	-77.95	-73.95	-78.95	-76.95
C3	-71.95	-75.95	-75.95	-74.62
C4	-68.95	-71.95	-74.95	-71.95
C5	-77.95	-75.95	-77.95	-77.28
C6	-73.95	-75.95	-76.95	-75.62
C7	-75.95	-78.95	-79.95	-78.28
C8	-73.95	-77.95	-79.95	-77.28
Median				-77.62

ATTC TEST # 305,306,307

RECEIVER	Undesired Power Level (dBm)		
	CCIR4 ("Woman with Roses")		
	208.25 MHz	208.83 MHz	209.41 MHz
A1	>-72.12	-74.91	-66.95
A2	-74.12	-75.91	-69.95
A3	-73.12	-73.91	>-65.95
A4	-72.12	>-73.91	-65.95
A5	>-72.12	-73.91	-65.95
A6	-73.12	-74.91	-68.95
A7	>-72.12	>-73.91	-65.95
A8	-72.12	>-73.91	>-65.95
B1	-73.12	-74.91	-66.95
B2	-74.12	-73.91	-66.95
B3	-72.12	>-73.91	>-65.95
B4	-73.12	-77.91	-70.95
B5	-73.12	-76.91	-70.95
B6	-74.12	>-73.91	-67.95
B7	-74.12	-74.91	-65.95
B8	>-72.12	>-73.91	>-65.95
C1	-73.12	-74.91	-67.95
C2	-72.12	-74.91	>-65.95
C3	>-72.12	>-73.91	>-65.95
C4	>-72.12	>-73.91	>-65.95
C5	-72.12	-73.91	>-65.95
C6	-74.12	-73.91	>-65.95
C7	>-72.12	>-73.91	-65.95
C8	>-72.12	>-73.91	>-65.95
Median	-72.12	-73.91	-65.95

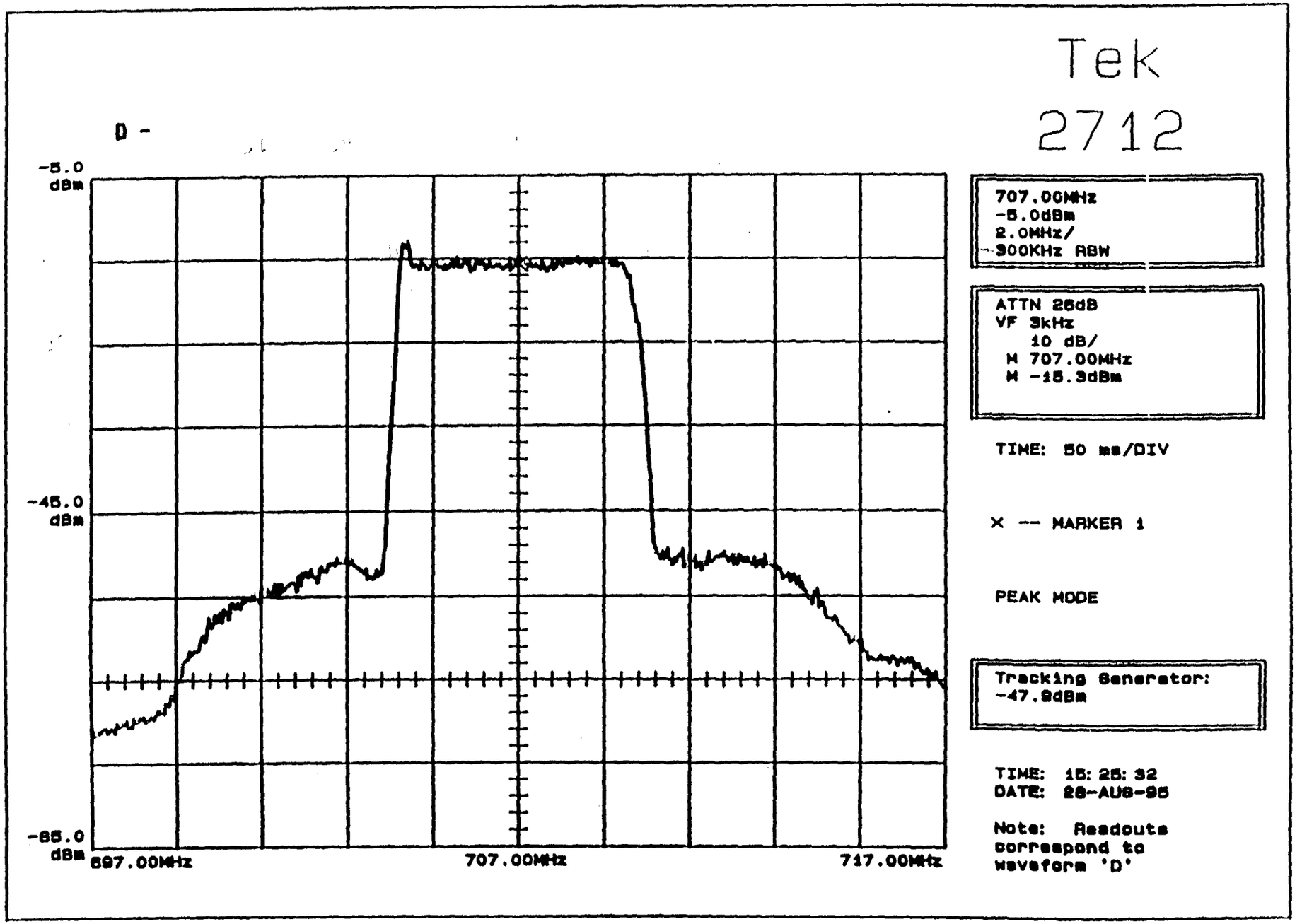
ATTC TEST # 308,309,310,311

RECEIVER	Undesired Power Level (dBm)			
	TOA (BTSC Stereo)			
	209.41 MHz	209.75 MHz	210.31 MHz	210.81 MHz
A1	-79.10	-84.88	-63.12	-42.04
A2	NT	NT	NT	NT
A3	NT	NT	NT	NT
A4	-75.10	-82.88	-64.12	-42.04
A5	-74.10	-78.88	-57.12	-43.04
A6	-73.10	-78.88	-58.12	-39.04
A7	NT	NT	NT	NT
A8	NT	NT	NT	NT
B1	-77.10	-83.90	-66.09	-45.04
B2	-76.10	-80.90	-65.09	-42.04
B3	-75.10	-78.90	-60.09	-40.04
B4	-74.10	-82.90	-63.09	-42.04
B5	-75.10	-82.90	-64.09	-46.04
B6	-80.10	-86.90	-65.09	-45.04
B7	-79.10	-86.90	-64.09	-43.04
B8	-71.10	NT	NT	NT
C1	-71.10	NT	-61.12	-45.04
C2	-76.10	NT	-62.12	-44.04
C3	-73.10	NT	-57.12	-45.04
C4	NT	NT	NT	NT
C5	-78.10	NT	-64.12	-43.04
C6	-78.10	NT	-64.12	-42.04
C7	NT	NT	NT	NT
C8	NT	NT	NT	NT
Median	-75.10	-82.90	-63.61	-43.04

NT - not tested, because the receiver was mono (A7,C4, C7, and C8) or because of time limitations.

Output of Field Test Transmitter

IOT output


Tek
2712
D -
-5.0 dBm
-45.0 dBm
-85.0 dBm
697.00MHz
707.00MHz
717.00MHz
707.00MHz
-5.0dBm
2.0MHz/
300KHz RBW
ATTN 26dB
VF 3kHz
10 dB/
M 707.00MHz
M -15.3dBm
TIME: 50 ms/DIV
X -- MARKER 1
PEAK MODE
Tracking Generator:
-47.9dBm
TIME: 15:25:32
DATE: 28-AUG-95
Note: Readouts correspond to waveform 'D'

Excerpts from Volume 47 of the Code of Federal Regulations
Section 73.687

accurate map of the community. The number of line intersections on the grid included within the boundaries of the community shall be at least equal to the required number of measuring locations. The position of each intersection on the community map determines the location at which a measurement shall be made.

(2) *Measurement procedure.* The field strength of the visual carrier shall be measured, with a voltmeter capable of indicating accurately the peak amplitude of the synchronizing signal. All measurements shall be made utilizing a receiving antenna designed for reception of the horizontally polarized signal component, elevated 9.1 meter (30 feet) above street level.

(i) Each measuring location shall be chosen as close as feasible to a point indicated on the map, as previously prepared, and at as nearly the same elevation as that point as possible.

(ii) At each measuring location, after equipment calibration and elevation of the antenna, a check is made to determine whether the strongest signal arrives from a direction other than from the transmitter.

(iii) At 20 percent or more of the measuring locations, mobile runs, as described in paragraph (b)(2) of this section shall be made, with no less than three such mobile runs in any case. The points at which mobile measurements are made shall be well separated. Spot measurements may be made at other measuring points.

(iv) Each actual measuring location is marked exactly on the map of the community, and suitably keyed. A written record shall be maintained, describing, for each location, factors which may affect the recorded field, such as the approximate time of measurement, weather, topography, overhead wiring, heights and types of vegetation, buildings and other structures. The orientation, with respect to the measuring location shall be indicated of objects of such shape and size as to be capable of causing shadows or reflections. If the strongest signal received was found to arrive from a direction other than that of the transmitter, this fact shall be recorded.

(3) *Method of reporting measurements.* A report of measurements to the Commission shall be submitted in affidavit form, in triplicate, and should contain the following information:

(i) A map of the community showing each actual measuring location, specifically identifying the points at which mobile runs were made.

(ii) A table keyed to the above map, showing the field strength at each measuring point, reduced to dBu for the actual effective radiated power of the station. Weather, date, and time of each measurement shall be indicated.

(iii) Notes describing each measuring location.

(iv) A topographic map of the largest available scale on which are marked the community and the transmitter site of the station whose signals have been measured, which includes all areas on or near the direct path of signal propagation.

(v) Computations of the mean and standard deviation of all measured field strengths, or a graph on which the distribution of measured field strength values is plotted.

(vi) A list of calibrated equipment used for the measurements, which for each instrument, specifies its manufacturer, type, serial number and rated accuracy, and the date of its most recent calibration by the manufacturer, or by a laboratory. Complete details of any instrument not of standard manufacture shall be submitted.

(vii) A detailed description of the procedure employed in the calibration of the measuring equipment, including field strength meters measuring antenna, and connecting cable.

[40 FR 27683, July 1, 1975, as amended at 50 FR 23701, June 5, 1985]

§ 73.687 Transmission system requirements.

(a) *Visual transmitter.* (1) The field strength or voltage of the lower sideband, as radiated or dissipated and measured as described in paragraph (a)(2) of this section, shall not be greater than −20 dB for a modulating frequency of 1.25 MHz or greater and in addition, for color, shall not be greater than −42 dB for a modulating frequency of 3.579545 MHz (the color subcarrier frequency). For both monochrome and color, the field strength or voltage of the upper sideband as radi-

ated or dissipated and measured as described in paragraph (a)(2) of this section shall not be greater than −20 dB for a modulating frequency of 4.75 MHz or greater. For stations operating on Channels 15–69 and employing a transmitter delivering maximum peak visual power output of 1 kW or less, the field strength or voltage of the upper and lower sidebands, as radiated or dissipated and measured as described in paragraph (a)(2) of this section, shall depart from the visual amplitude characteristic (Figure 5a of §73.699) by no more than the following amounts:

−2 dB at 0.5 MHz below visual carrier frequency;
−2 dB at 0.5 MHz above visual carrier frequency;
−2 dB at 1.25 MHz above visual carrier frequency;
−3 dB at 2.0 MHz above visual carrier frequency;
−6 dB at 3.0 MHz above visual carrier frequency;
−12 dB at 3.5 MHz above visual carrier frequency;
−8 dB at 3.58 MHz above visual carrier frequency (for color transmission only).

The field strength or voltage of the upper and lower sidebands, as radiated or dissipated and measured as described in paragraph (a)(2) of this section, shall not exceed a level of −20 dB for a modulating frequency of 4.75 MHz or greater. If interference to the reception of other stations is caused by out-of-channel lower sideband emission, the technical requirements applicable to stations operating on Channels 2–13 shall be met.

(2) The attenuation characteristics of a visual transmitter shall be measured by application of a modulating signal to the transmitter input terminals in place of the normal composite television video signal. The signal applied shall be a composite signal composed of a synchronizing signal to establish peak output voltage plus a variable frequency sine wave voltage occupying the interval between synchronizing pulses. (The "synchronizing signal" referred to in this section means either a standard synchronizing wave form or any pulse that will properly set the peak.) The axis of the sine wave in the composite signal observed in the output monitor shall be maintained at an amplitude 0.5 of the voltage at synchronizing peaks. The amplitude of the sine wave input shall be held at a constant value. This constant value should be such that at no modulating frequency does the maximum excursion of the sine wave, observed in the composite output signal monitor, exceed the value 0.75 of peak output voltage. The amplitude of the 200 kHz sideband shall be measured and designated zero dB as a basis for comparison. The modulation signal frequency shall then be varied over the desired range and the field strength or signal voltage of the corresponding sidebands measured. As an alternate method of measuring, in those cases in which the automatic d-c insertion can be replaced by manual control, the above characteristic may be taken by the use of a video sweep generator and without the use of pedestal synchronizing pulses. The d-c level shall be set for midcharacteristic operation.

(3) A sine wave, introduced at those terminals of the transmitter which are normally fed the composite color picture signal, shall produce a radiated signal having an envelope delay, relative to the average envelope delay between 0.05 and 0.20 MHz, of zero microseconds up to a frequency of 3.0 MHz; and then linearly decreasing to 4.18 MHz so as to be equal to −0.17 μsecs at 3.58 MHz. The tolerance on the envelope delay shall be ±0.05 μsecs at 3.58 MHz. The tolerance shall increase linearly to ±0.1 μsec down to 2.1 MHz, and remain at ±0.1 μsec down to 0.2 MHz. (Tolerances for the interval of 0.0 to 0.2 MHz are not specified at the present time.) The tolerance shall also increase linearly to ±0.1 μsec at 4.18 MHz.

(4) The radio frequency signal, as radiated, shall have an envelope as would be produced by a modulating signal in conformity with §73.682 and Figure 6 or 7 of §73.699, as modified by vestigial sideband operation specified in Figure 5 of §73.699. For stations operating on Channels 15–69 the radio frequency signal as radiated, shall have an envelope as would be produced by a modulating signal in conformity with §73.682 and Figure 6 or 7 of §73.699.

(5) The time interval between the leading edges of successive horizontal pulses shall vary less than one half of

one percent of the average interval. However, for color transmissions, § 73.682(a) (5) and (6) shall be controlling.

(6) The rate of change of the frequency of recurrence of the leading edges of the horizontal synchronizing signals shall be not greater than 0.15 percent per second, the frequency to be determined by an averaging process carried out over a period of not less than 20, nor more than 100 lines, such lines not to include any portion of the blanking interval. However, for color transmissions, § 73.682(a) (5) and (6) shall be controlling.

(b) *Aural transmitter.* (1) Pre-emphasis shall be employed as closely as practicable in accordance with the impedance-frequency characteristic of a series inductance-resistance network having a time constant of 75 microseconds. (See upper curve of Figure 12 § 73.699.)

(2) If a limiting or compression amplifier is employed, precaution should be maintained in its connection in the circuit due to the use of pre-emphasis in the transmitting system.

(3) Aural modulation levels are specified in § 73.1570.

(c) *Requirements applicable to both visual and aural transmitters.* (1) Automatic means shall be provided in the visual transmitter to maintain the carrier frequency within ±1 kHz of the authorized frequency; automatic means shall be provided in the aural transmitter to maintain the carrier frequency 4.5 MHz above the actual visual carrier frequency within ±1 kHz.

(2) The transmitters shall be equipped with suitable indicating instruments for the determination of operating power and with other instruments necessary for proper adjustment, operation, and maintenance of the equipment.

(3) Adequate provision shall be made for varying the output power of the transmitters to compensate for excessive variations in line voltage or for other factors affecting the output power.

(4) Adequate provisions shall be provided in all component parts to avoid overheating at the rated maximum output powers.

(d) The construction, installation, and operation of broadcast equipment is expected to conform with all applicable local, state, and federally imposed safety regulations and standards, enforcement of which is the responsibility of the issuing regulatory agency.

(e) *Operation.* (1) Spurious emissions, including radio frequency harmonics, shall be maintained at as low a level as the state of the art permits. As measured at the output terminals of the transmitter (including harmonic filters, if required) all emissions removed in frequency in excess of 3 MHz above or below the respective channel edge shall be attenuated no less than 60 dB. below the visual transmitted power. (The 60 dB. value for television transmitters specified in this rule should be considered as a temporary requirement which may be increased at a later date, especially when more higher-powered equipment is utilized. Stations should, therefore, give consideration to the installation of equipment with greater attenuation than 60 dB.) In the event of interference caused to any service greater attenuation will be required.

(2) If a limiting or compression amplifier is used in conjunction with the aural transmitter, due operating precautions should be maintained because of pre-emphasis in the transmitting system.

(3) TV broadcast stations operating on Channel 14 and Channel 69 must take special precautions to avoid interference to adjacent spectrum land mobile radio service facilities. Where a TV station is authorized and operating prior to the authorization and operation of the land mobile facility, a Channel 14 station must attenuate its emissions within the frequency range 467 to 470 MHz and a Channel 69 station must attentuate its emissions within the frequency range 806 to 809 MHz if necessary to permit reasonable use of the adjacent frequencies by land mobile licensees.

(4) The requirements listed below apply to permittees authorized to construct a new station on TV Channel 14 or TV Channel 69, and to licensees authorized to change the channel of an existing station to Channel 14 or to Channel 69, to increase effective radiated power (ERP) (including any

change in directional antenna characteristics that results in an increase in ERP in any direction), or to change the transmitting location of an existing station.

(i) For the purposes of this paragraph, a protected land mobile facility is a receiver that is intended to receive transmissions from licensed land mobile stations within the frequency band below 470 MHz (as relates to Channel 14) or above 806 MHz (as relates to Channel 69), and is associated with one or more land mobile stations for which a license has been issued by the Commission, or a proper application has been received by the Commission prior to the date of the filing of the TV construction permit application. However, a land mobile facility will not be protected if it is proposed in an application that is denied or dismissed and that action is no longer subject to Commission review. Further, if the land mobile station is not operating when the TV facility commences operation and it does not commence operation within the time permitted by its authorization in accordance with part 90 of this chapter, it will not be protected.

(ii) A TV permittee must take steps before construction to identify potential interference to normal land mobile operation that could be caused by TV emissions outside the authorized channel, land mobile receiver desensitization or intermodulation. It must install filters and take other precautions as necessary, and submit evidence that no interference is being caused before it will be permitted to transmit programming on the new facilities pursuant to the provisions of §73.1615 or §73.1620 of this part. A TV permittee must reduce its emissions within the land mobile channel of a protected land mobile facility that is receiving interference caused by the TV emission producing a vertically polarized signal and a field strength in excess of 17 dBu at the land mobile receiver site on the land mobile frequency. The TV emission should be measured with equipment set to a 30 kHz measurement bandwidth including the entire applicable land mobile channel. A TV permittee must correct a desensitization problem if its occurrence can be directly linked to the start of the TV operation and the land mobile station is using facilities with typical desensitization rejection characteristics. A TV permittee must identify the source of an intermodulation product that is generated when the TV operation commences. If the intermodulation source is under its control, the TV permittee must correct the problem. If the intermodulation source is beyond the TV permittee's control, it must cooperate in the resolution of the problem and should provide whatever technical assistance it can.

(Secs. 4, 5, 303, 48 Stat., as amended, 1066, 1068, 1082 (47 U.S.C. 154, 155, 303))

[28 FR 13660, Dec. 14, 1963]

EDITORIAL NOTE: For FEDERAL REGISTER citations affecting §73.687, see the List of CFR Sections Affected in the Finding Aids section of this volume.

§73.688 Indicating instruments.

(a) Each TV broadcast station shall be equipped with indicating instruments which conform with the specifications described in §73.1215 for measuring the operating parameters of the last radio stage of the visual transmitter, and with such other instruments as are necessary for the proper adjustment, operation, and maintenance of the visual transmitting system.

(b) The function of each instrument shall be clearly and permanently shown on the instrument itself or on the panel immediately adjacent thereto.

(c) In the event that any one of these indicating instruments becomes defective, when no substitute which conforms with the required specifications is available, the station may be operated without the defective instrument pending its repair or replacement for a period not in excess of 60 days without further authority of the FCC, provided that:

(1) If the defective instrument is the transmission line meter used for determining the output power by the direct method, the operating power shall be determined or maintained by the indirect method whenever possible or by using the operating parameters of the last radio stage of the transmitter during the time the station is operated without the transmission line meter.

Excerpts from FCC Fifth Further Notice of Proposed Rule Making
MM Docket No. 87-268
Topic V. Protection from Interference

well publicized.[52] Moreover, it states that the value of 16:9 for aspect ratio was decided upon only after long debate and that "due consideration was given to the then current practices both in North America and around the world."[53] That aspect ratio, it continues, has been adopted internationally in the International Telecommunications Union for HDTV and for EDTV in Europe and Japan.[54] SMPTE states that it has been demonstrated that there is no difficulty in accommodating program material or motion picture films of any reasonable aspect ratio within the 16:9 format either for production and post-production, distribution or display.[55] Material originally composed for a 2:1 aspect ratio, it continues, could be accommodated by leaving 11% of the vertical space unused.

53. Additionally, we note that low power television station ("LPTV") operators generally want to be included in the implementation of digital technology, and have suggested that, if LPTV is excluded, its continued viability would be jeopardized. LPTV commenters in the past rounds of the digital TV proceeding have focused their comments primarily on issues such as DTV eligibility, channel allotments and interference criteria, issues perceived to affect the continued existence of their stations rather than upon the ATSC DTV Standard itself. Nevertheless, the LPTV industry is concerned that any standards that could adversely affect their operations be thoroughly documented in this proceeding.[56]

54. We seek comment on these issues. However, note that the ATSC DTV Standard was arrived at only after years of thoughtful consideration and expert research and development in an open process in which all interests were able to participate. Accordingly, we believe that those opposing our mandate of the ATSC DTV Standard should have the burden of persuasion as to why that standard should not be adopted.

V. Protection from Interference.

55. Protection from interference is a fundamental Commission function that must be considered when introducing new technologies into spectrum allocations currently in use. In this situation, we are, in effect, considering sharing criteria to govern the technical interaction

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[52] Letter of Stanley Baron, President, Society of Motion Picture and Television Engineers, 18 August 1995, at 1-2.

[53] Id. at 2.

[54] Id.

[55] Id. at 3. In this regard it notes that there is a broad range of aspect ratios that has been employed in modern times and that there is no single aspect ratio that is usable universally.

[56] See, e.g., Comments of Abacus Television in response to the Fourth Further Notice, at 24-25.

between the old and new technologies. Many of these criteria will be considered in the near future, when we propose an initial Table of DTV Allotments and technical criteria for amending that Table with additional DTV allotments in the future.[57] We expect that the DTV allotments and allotment criteria will be based on the ATSC DTV Standard and the performance of the DTV system it describes, as determined by the extensive ACATS measurement program. In addition to criteria we will propose then, there are some interference-related aspects of the ATSC DTV Standard that we shall explore now. In the following paragraphs, we solicit comment on limitations on stations using the ATSC DTV Standard that might be needed to avoid objectionable interference to reception of either existing NTSC service or the reception of other stations that use the ATSC DTV Standard.

56. Aside from the technical parameters that directly affect the development of a DTV allotment plan, several related considerations affect whether stations operating in accordance with the ATSC DTV Standard cause more interference than predicted based on the system performance measurements. First, we propose to adopt an emission mask, limiting the out-of-channel emissions from a DTV station transmitter, measured after any external filter that may be used and based on a measurement bandwidth of 500 kHz. We seek comment on the following emission mask: (A) at the channel edge, emissions attenuated no less than 35 dB below the average transmitted power; (B) more than 6 MHz from the channel edge, emissions attenuated no less than 60 dB below the average transmitted power; and (C) at any frequency between 0 and 6 MHz from the channel edge, emissions attenuated no less than the value determined using the following formula:

$$\text{Attenuation in dB} = 35 + [(\Delta f)^2/1.44]$$

Where: Δf = frequency difference in MHz from the edge of the channel

This proposal is derived from analysis of the ACATS test results for protection of adjacent channel stations. The attenuation level is based on an assumption that the average DTV power in a 6 MHz channel is 12 dB less than the NTSC station effective radiated power (ERP). This power difference provides approximately equal noise limited coverage for DTV and NTSC stations in the UHF frequency band. If DTV stations are permitted to operate in a co-located adjacent channel arrangement with average DTV power exceeding that assumed value (12 dB below the co-located NTSC station's ERP), greater attenuation of the out-of-band emissions may be required.[58]

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[57] We anticipate that in making such a proposal, we also would seek comment on a permitted DTV power for each allotment, a definition of service area and interference desired-to-undesired ratios developed from the ACATS work and data.

[58] In recent years, the Global Positioning System (GPS), which uses the frequency band at 1575.42 +/-10 MHz, has come into increased use. It is being considered as a replacement for Instrument Landing Systems for aircraft navigation during landings. We are aware of

57. Second, ACATS has reported interference from an upper-adjacent channel DTV signal to reception of an NTSC station that is related to the precise location of the DTV signal pilot carrier frequency.[59] To prevent interference to NTSC receivers from this source, we are proposing to require an ATSC DTV Standard station pilot frequency to be located 5.082138 MHz above the visual carrier of the lower adjacent channel NTSC station. The above stated frequency difference between the NTSC visual carrier and the DTV VSB pilot would need to be maintained within a tolerance of +/- 3 Hz.[60]

58. Third, we propose to specify the maximum power for each DTV station as an average power across the occupied bandwidth, so an appropriate method or methods of determining operating power will be different from the established NTSC procedures, which determine the power transmitted during each synchronizing pulse (peak power). We propose that stations using the ATSC DTV Standard would be allowed to determine their average power using conventional RMS averaging power meters. While that would be the official method for determining compliance with the authorized power limits, we propose that such stations would be allowed to decide how they would remain in compliance with their power limits. We seek comment on all of the foregoing including whether the proposed limits on out-of-channel emissions, pilot carrier frequency tolerance and average power determination are appropriate and represent the minimum necessary requirements for controlling the interference potential of stations operating in conformance with the ATSC DTV standard. We also seek comment on whether the proposed limits are sufficient for this purpose, or if other parameters also need to be constrained.

59. In addition to rules restricting broadcast stations that relate to interference concerns, there are many rules that establish procedures or have been applied broadly to all broadcast stations. We propose to modify many of them to include DTV, or to adapt them

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concern about interference that might be caused by insufficient suppression of spurious emissions from TV stations (including DTV and mainly focusing on UHF TV channels 23 and 66, because GPS operates at a harmonic frequency of these channels) and we seek comments.

[59] ACATS Final Technical Report at 5.2.8. "With regard to upper adjacent-channel video interference ATV-into-NTSC, the tests found a 'color stripe' artifact in the NTSC video at all NTSC power levels. Analysis shows that it is caused by the ATV pilot carrier frequency 'beating' with the NTSC color subcarrier. Analysis also suggests that another 'luminance beat,' hidden during the testing by the color beat, would be present, caused by the ATV pilot carrier beating with the NTSC visual carrier. Finally, during these tests, some NTSC receivers showed loss of color and other picture artifacts. The analysis shows that use of precision carrier offset between the ATV pilot and the NTSC color subcarrier will eliminate visibility of both artifacts."

[60] See Annex to ACATS Report, Record of Test Results for Digital HDTV Grand Alliance System, (October, 1995), at I-14-67.

and create new DTV rules, as appropriate so that eligible licensees might move quickly to introduce this new technology to consumers. A preliminary list of these technical and procedural rules is attached as Appendix A. We seek comment on whether they should be modified to include DTV, be changed to treat DTV differently than NTSC or other broadcast services are treated, or if they need not be applied to DTV. Commenters addressing this issue should provide specific recommendations, rule-by-rule, as to the modifications they advocate.

VI. Interoperability.

60. Cross-Industry Interoperability. Compatibility with other transmission forms and media applications has been an important issue throughout this proceeding. Since its inception, ACATS emphasized the need for DTV broadcasting technology to be interoperable with alternative media.[61] In addition, ACATS has recognized that interoperability takes on critical importance given the future needs for high resolution digital imagery and the development of a National Information Infrastructure. ACATS believes that the ATSC DTV Standard is suitably interoperable with other video delivery media and imaging systems, including cable television, direct broadcast satellite, and computer systems. A working party tasked to study interoperability developed recommendations that led to agreement on so-called "headers and descriptors." This method of data identification, combined with advanced data packetization techniques, acts as a kind of translator to tell all digital devices what type of data is being transmitted.

61. The working party and an "interoperability review panel" also adopted a list of eleven characteristics critical to interoperability based on the needs and desires exhibited by alternative media advocates.[62] ACATS believes the Grand Alliance video system adequately addresses all eleven factors. For example, compliance with the MPEG-2 standard was emphasized by the Technical Subgroup and adopted by the Grand Alliance to increase international compatibility and, more importantly, interoperability among a variety of digital devices. In addition, progressive scanning and square pixels were included because these attributes are preferable for some -- particularly computer -- applications. As noted earlier, some advocates feel that the ATSC DTV Standard should go further, especially with regard to the exclusive use of progressive scanning.[63]

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[61] This description of the ACATS position on interoperability is largely derived from the ACATS Report at 15-16.

[62] ACATS Report, Appendix I.

[63] See, Comments of Apple Computer, Inc. (in response to the Fourth Further Notice) at 4-7; see also Testimony of Joseph Tasker on behalf of the Computer Industry Coalition on Advanced Television Service at the Commission's December 12, 1995, en banc hearings on digital television.